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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Masatada Numano

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EXAMINER

KERNS, KEVIN P

ART UNIT

PAPER NUMBER

1793

MAIL DATE

DELIVERY MODE

06/17/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/579,442	Applicant(s) NUMANO ET AL.	
	Examiner Kevin P. Kerns	Art Unit 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 May 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) 10-14 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 May 2006 and 27 January 2009 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li et al. (US 6,173,755) in view of JP 5-318040 (cited in applicants' IDS dated 5/15/06, with a complete translation of the Japanese reference provided by applicants in their current response of 5/19/09).

Regarding claims 1, 2, and 7-9, Li et al. disclose a casting nozzle having multiple layers of differing materials (see column 2, lines 50-67; column 3, lines 1-67; column 4, lines 1-11 and 44-67; column 5, lines 1-20 and 54-67; column 6, lines 1-67; Example 1;

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and Figures 1, 5, and 9), in which the casting nozzle (20,120) supplies molten metal 40 (aluminum or aluminum alloys) from a tundish (container 11,111) to a movable mold (multiple pairs of rolls 134 and continuous belts 112 in the continuous casting apparatus 110 of Figure 9, or alternatively, with roll casters comprising a movable mold pair of rolls – column 6, lines 66-67), in which the nozzle (20,120) is fixed to the tundish (11,111) that stores molten metal 40, such that the tip of the casting nozzle (20,120) includes multiple (i.e. first and second) layers of differing materials that comprise resilient insulating layers (26,126) that are elastic and thermally insulating, such as PYROTEK (which has a heat conductivity of 0.19-0.26 W/mK, and less than 0.2 W/mK at temperatures below 500 C – as set forth in the material data sheets referenced by the applicants on page 6 of the remarks section of the amendment dated March 12, 2008) and a layer of (highly heat conductive carbon) graphite (27,127) in the form of a flexible (elastic) foil having a thickness of 0.01 inch (0.254 mm) at the casting nozzle tip portion 24 (Figure 5).

Regarding claims 2-4, the casting nozzle tip portion 24 arranged on the movable mold side (in this instance, graphite layer (27,127) of 1.8 g/cm^3 , as cited in Table I on page 27 of the applicants' specification – see paragraph [0039]) is a high density layer of $>0.7 \text{ g/cm}^3$, and has a high strength layer (graphite layer (27,127) of 25.5 MPa in Table I) of tensile strength of $>10 \text{ MPa}$.

Regarding claims 2, 5, and 6, the casting nozzle tip portion 24 arranged on the movable mold side (graphite layer (27,127)) has a highly elastic layer of elastic modulus of $>5,000 \text{ MPa}$ (Table I recites that graphite has a value of 9,800 MPa), and has a first

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highly heat-conductive layer having a heat conductivity of >16.7 W/mK) – Table I recites that graphite has a significantly higher value of 120 W/mK.

Li et al. do not disclose that the first high heat-conductive layer (>16.7 W/mK) is arranged on the molten/liquid (metal) side of the nozzle so as to be in contact with the molten/liquid (metal) and deformability of the elastic layer of the casting nozzle tip upon making close contact with the movable mold.

However, JP 5-318040 discloses a device (nozzle) for sealing molten metal on a cooling casting roll 14 (abstract; paragraphs [0005]-[0020] of translation; and Figures 1-3), in which the nozzle includes a first (elastic) ceramic fiber felt layer 20 (low heat conductivity) and a metal strip 30 (second layer of high heat conductivity of >16.7 W/mK, including Mo of 142 W/mK, SUS 304 steel (paragraph [0018]), and SUS 316 steel of 16.7 W/mK) interposed between the first (elastic) ceramic fiber felt layer 20 and cooling roll 14 (molten/liquid metal side of the nozzle that is in contact with the molten/liquid metal during the casting process – see paragraphs [0017] and [0020] of translation) so that the tip portion of the nozzle retreats (elastically deforms while in contacting engagement with the casting roll 14) by 1-5 mm for the tip part of the pouring nozzle, for the purpose of preventing leakage of molten metal and preventing formation of defects in the cast product of a continuous casting process (abstract; and paragraphs [0005]-[0009], [0017], and [0020] of translation).

It would have been obvious to one of ordinary skill in the art at the time the applicants' invention was made to modify the casting nozzle having multiple layers of differing materials, as disclosed by Li et al., by using the multiple layer nozzle having a

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first high heat-conductive layer on the molten/liquid metal side of the nozzle so as to be in contact with the molten/liquid (metal) and deformability of the elastic layer of the casting nozzle tip upon making close contact with the movable mold, as taught by JP 5-318040, in order to prevent leakage of molten metal and to prevent formation of defects in the cast product of a continuous casting process (JP 5-318040; abstract; and paragraphs [0005]-[0009], [0017], and [0020] of translation).

Response to Arguments

4. The examiner acknowledges the applicants' amendment provided with the request for continued examination received by the USPTO on May 19, 2009. The amendments overcome the prior objections to the drawings and claim 6. Claims 10-14 remain withdrawn from consideration as drawn to non-elected inventions. Claims 1-9 remain under consideration in the application.

5. Applicants' arguments filed May 19, 2009 have been fully considered but they are not persuasive.

With regard to the applicants' remarks/arguments on pages 6-8 of the amendment, it is noted that the newly underlined portions in the above 35 USC 103(a) rejections are provided in response to the applicants' amendments to independent claims 1 and 2. Regarding their specific arguments, the applicants have provided arguments regarding the 35 USC 103(a) rejections (Li in view of JP '040) of claims 1-9, in particular in addressing independent claims 1 and 2. Importantly, the newly amended

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limitation *"so as to be in contact with the molten liquid"* (of independent claims 1 and 2, and of which the examiner has underlined above for clarity) is disputed by the applicants as allegedly not being disclosed and/or suggested by JP '040, as set forth throughout pages 6 and 7 of the remarks section).

First, the applicants cite paragraphs [0013] and [0014] of JP '040 and state (in the middle of page 7 of the remarks section) that the *"metal strip (plate) 30 is sealed between the ceramic fiber felt layer 20 and the cooling roll 14, and does not contact with the molten metal"* and *"[t]his ceramic fiber felt layer 20 does not contact molten metal directly"*. It is noted that the latter statement is contrary to the applicants' statement in their previous amendment of *"What is disposed on the molten liquid side in JP '040 is the ceramic fiber felt layer 20..."*. Importantly, the applicants state (in the paragraph bridging pages 7 and 8 of the remarks section) that *"It should be noted that the molten metal is disposed and flows on the portion 12b in FIG. 3 of JP '040, NOT between the nozzle 12 and the cooling roll 14 (see FIG. 2 of JP '040). As such, the metal strip (plate) 30 of JP '040 is not arranged on the molten liquid side so as to be in contact with the molten liquid, as recited by claim 1"*. The examiner respectfully disagrees with these arguments, as there is not enough information to be gleaned from paragraphs [0013] and [0014] of the translation to make these assertions. Moreover, the applicants are referred to paragraphs [0017] and [0020] of the translation which state *"the oxide of molten metal adheres to a casting roll"* (paragraph [0017]) and *"affix smoothing to a cooling roller"* (paragraph [0020]). As discussed in the final rejection mailed March 9, 2009, the examiner agrees that JP '040 only discloses one cooling roll, such that the

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continuous casting of metal strip would therefore be conducted between the casting roll and the nozzle (rather than between two rolls in a twin-roll casting process). As a result, the molten metal contacts the metal strip 30 and the cooling roll 14, such that metal strip 30 is arranged on the molten liquid side so as to be in contact with the molten liquid, thus meeting the disputed limitations of independent claims 1 and 2.

Second, the applicants recite paragraph [0013] of the translation that the *“ceramic fiber felt layer 20 does not contact the molten metal directly”* (in the paragraph bridging pages 7 and 8 of the remarks section), but this statement actually weakens their argument since this layer 20 is not contacting the molten metal. If there is no contact by layer 20, then what structure(s) would contact the molten metal in addition to the tundish? In the teachings of JP '040, molten metal contacts cooling roller 14 and metal plate 30, as the roller 14 shapes the molten metal into a cast metal strip (and oxide of molten metal adheres to a casting roll, as set forth in paragraph [0017] of translation). It is also noted that the continuous casting apparatus of JP '040 is similar to that of JP 63-101053, which is also cited in the applicants' IDS of 5/15/06. As shown in Figures 1-3 of JP 63-101053, a (single) rotating roll 1 forms a metal strip from molten metal dispensed from a tundish 3 defined by the roll 1 and the strip-defining (nozzle) portion of the tundish 3. JP 63-101053 clearly shows that the casting roll defines the lower portion of the cast strip, whereas the nozzle (edge portion) of the tundish defines the upper portion of the cast strip. JP '040 does not distinctly show any strip being cast, but in a single roll casting process (of which Figure 1 only shows a single roller 14), the strip must necessarily contact the single roller 14 to define the lower portion of the strip.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin P. Kerns whose telephone number is (571)272-1178. The examiner can normally be reached on Monday-Friday from 8:00am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jessica Ward can be reached on (571) 272-1223. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Kevin P. Kerns
Primary Examiner
Art Unit 1793

/Kevin P. Kerns/
Primary Examiner, Art Unit 1793
June 13, 2009